

Applicant : Michael Dennis Hardwick et al
Serial No.: 10/576,336

Date: 4/24/07

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Amendments to the Specification:

Please delete the paragraph beginning at page 3, line 14, and ending at page 3, line 23, and insert, instead, the following paragraph:

Thus according to a first aspect of the present invention there is provided a control system for controlling apparatus remotely in response to changes of a variable, ~~characterised in that said~~ which control system comprises a sensor module to sense the variable, a controller module operatively associated with the sensor module and including a radio transceiver operative to transmit a control signal when the variable changes and to transmit and receive system management signals, and a responder module arranged remote from the controller module and including a radio transceiver operative to receive the control signal and to receive and transmit system management signals, wherein the system is programmable to define the control signal.

Please delete the paragraph beginning at page 3, line 24, and ending at page 4, line 4, and insert, instead, the following paragraph:

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The sensor module may sense an electrical input, e.g., to control apparatus in response to the presence or absence of users of the controlled apparatus, either through a passive infra-red detector (PIR) or the like or by means of connection to an intruder alarm, or to control emergency lights in response to an electrical power failure. The electrical input controlled apparatus may ~~comprise electrical lighting which is turned on when persons are present and turned off when persons are absent~~ also come from a building management system (BMS).

Please delete the paragraph beginning at page 4, line 5, and ending at page 4, line 13, and insert, instead, the following paragraph:

The sensor module may otherwise ~~sense electrical mains power and the controlled apparatus comprise emergency lighting arranged to be turned on if the electrical mains power fails.~~

~~—The variable may be a natural variable.~~ Thus the controlled apparatus may comprise heating apparatus or cooling apparatus controlled in response to ambient temperature. Otherwise the controlled apparatus may comprise electrical lighting apparatus controlled in response to ambient light level. Such electrical

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lighting apparatus may comprise a fluorescent unit including a dimmable ballast operatively associated with the responder module and adjustable thereby, and adjustment of the dimmable ballast by the responder module may be such that the perceived output of the fluorescent unit varies substantially linearly.

Please delete the paragraph beginning at page 4, line 14, and ending at page 4, line 15, and insert, instead, the following paragraph:

To enable the system to be extended, the responder module may comprise be programmable to function as a repeater for said the signals.

Please delete the paragraph beginning at page 4, line 16, and ending at page 4, line 18, and insert, instead, the following paragraph:

To reduce system costs, the radio transceiver of the controller module is preferably of the same form as the radio transceiver of the responder module.

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Please delete the paragraph beginning at page 4, line 26, and ending at page 5, line 15, and insert, instead, the following paragraph:

Those skilled in the science will now appreciate that a system according to the present invention allows many different units of apparatus (lights, space heaters, water heaters, chillers, computers and so forth) in different locations to be controlled according to changes in a variety of variables (ambient temperature, light level, presence or absence of personnel and so forth). In effect the system can substitute for a building management system without the need for the extensive and expensive wiring conventionally associated with building management systems. By way of illustrating the versatility of the present invention, the system may be arranged on its input side so that a said sensor module senses ~~(a) the presence or absence of users of a said device~~ people (through a passive infra-red (PIR) device or the like, or through an input from an intruder alarm) or ~~;(b)~~ ambient temperature or ambient light level and/or electrical mains power supply. On its output side the system may be arranged to control electrical lighting (including emergency lighting) [[,]] or heating apparatus or cooling apparatus and/or any other apparatus that

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needs to be controlled, whether for energy saving or other purposes.

Please delete the paragraph beginning at page 5, line 16, and ending at page 5, line 18.

Please delete the paragraph beginning at page 5, line 19, and ending at page 5, line 25, and insert, instead, the following paragraph:

To ensure orderly organisation of the system, the system management signals preferably include identity signals individual to the responder modules. The system management signals may also include identity signals individual to a set of responder modules arranged in a group or a zone, which set can be ~~switched on or off~~ operative together. A large number of individual identities can be simply provided by the use of ~~The identity signals each comprise four hexadecimal digits , to permit a large number of individual identities for the identity signals.~~

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Please delete the paragraph beginning at page 5, line 26, and ending at page 6, line 18, and insert, instead, the following paragraph:

Preferably the controller module includes a status array recording the proper status of the responder modules (that is, the status which each responder module is intended to have). The controller module may also include reset means operative to check the actual status of each responder module against the recorded status and to indicate any discrepancy. The controller module may be operative to ~~switch control units of the controlled apparatus together on and off alternatively~~ by transmitting a global switch control signal associated with the identity signals of the corresponding responder modules followed by status request signals to those responder modules seriatim. With this arrangement each responder module is preferably arranged to respond to its status request signal by transmitting an actual status signal for receipt by the controller module and comparison with the record in the status array. If for any responder module there is a discrepancy between the actual status and the record, the controller module may transmit a correction signal to change the status of that responder module to its proper status. Then the responder module may transmit

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a confirmation signal to the controller module, and if no such confirmation signal is received by the controller module the responder module concerned may be recorded as faulty.

Please delete the paragraph beginning at page 6, line 19, and ending at page 7, line 1, and insert, instead, the following paragraph:

Preferably the control system includes a computer whereby the controller module is programmed and an interface whereby control and/or management information of the system is delivered to and/or from the computer. To enable the system to work with a general purpose personal computer (PC) the interface preferably utilises a command language suitable for a PC, such as RS232 or Ethernet. As well as receiving information from the system, the computer is preferably also operable to supply control and/or management information. To this end the computer may conveniently include a graphical user interface (GUI) whereby said control and/or management information is supplied.

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Please delete the paragraph beginning at page 7, line 17, and ending at page 8, line 2, and insert, instead, the following paragraph:

Thus according ~~According~~ to a second aspect of the present invention there is therefore provided a building management system comprising a plurality of sensor modules operative at a plurality of sensor locations to sense one or more variables, each sensor module being associated with a radio transmitter operative in use to transmit ~~transmitting from the sensor~~ its location radio control signals related to its sensed variable, and a plurality of responder modules operative at a plurality of responder locations to control apparatus, each responder module in use receiving radio control signals related to the variables sensed by the sensor modules and controlling said apparatus automatically in response thereto, ~~characterised in that~~ the sensor modules and responder modules being ~~are~~ mutually similar in including a common radio transceiver and signal processor and mutually different in including specific functional variations, and a controller module operatively associated the sensor modules, which controller module is programmable to define the control signals.

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Please delete the paragraph beginning at page 8, line 10, and ending at page 8, line 12, and insert, instead, the following paragraph:

The use of modules differing only in function enables ~~By these~~ means an extensive building management system may to be built up readily and inexpensively from a number of essentially similar modules.

Please delete the paragraph beginning at page 8, line 13, and ending at page 8, line 19, and insert, instead, the following paragraph:

According to a third aspect of the invention there is provided a method of controlling facilities of a building in response to changes of a plurality of variables, which method comprises (a) sensing said changes at a plurality of sensor locations, (b) programmably defining transmitting control signals representing said changes, (c) transmitting the defined control signals from the sensor locations to a plurality of facility locations for control of facilities thereat, and (d) transmitting management signals between the sensor locations and the facility locations, wherein

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~~characterised in that all said control signals and management~~
signals are wireless.

Please delete the two paragraphs beginning at page 8, line 26,
and ending at page 9, line 7, and insert, instead, the following
single paragraph:

Preferably at least some of said signals are transmitted by
way of a central location, where they may be monitored by ~~Also,~~
~~additional signals may be transmitted from the central location, eg~~
~~control signals, management signals or signals comprise signals~~
~~operative to alter the sensing and/or the control of facilities.~~
~~Preferably signals when received are subjected to a cyclical~~
redundancy check in which an algorithm is applied to generate a
comparison for the received signal. The definition of the control
signals is preferably programmed from the central location.